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RESEARCH ARTICLE

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Chromosome numbers for the Italian flora: 15

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Abstract

The chromosome numbers for seven Italian endemic taxa of *Armeria* (Plumbaginaceae) are here presented, including three species (*Armeria aspromontana*, *A. garganica*, and *A. macropoda*) for which chromosome data are reported for the first time. Overall, this study confirms the diploid status and the chromosomal stability of *Armeria*.

Keywords

Armeria, cytotaxonomy, endemism, Plumbaginaceae

How to contribute

Texts concerning new chromosome data should be submitted electronically to Antonio Giacò (antonio.giaco@biologia.unipi.it), including indications on voucher specimens and methods used.

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Chromosome counts

Armeria aspromontana Brullo, Scelsi & Spamp. (Plumbaginaceae)

Chromosome number. $2n = 18$ (Fig. 1).

Voucher specimen. **Italy**. **Calabria**. Italia, Bocca del Lupo, Aspromonte, Contrada Nardello (WGS84: 38.156663°N, 15.871213°E), 23 June 2019, *L. Bernardo* (PI066769).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 h and then fixed in Carnoy solution for 1 h. After hydrolysis in 1N HCl at 60 °C for 7.5 minutes, the tips were stained with leuco-basic fuchsine.

Observations. *Armeria aspromontana* is endemic to the Aspromonte Massif (Brullo et al. 1997). The chromosome number of this species is reported here for the first time, and is in line with that observed in all other *Armeria* taxa (Rice et al. 2015; Peruzzi and Bedini 2024).

Armeria brutia Brullo, Gangale & Uzunov (Plumbaginaceae)

Chromosome number. $2n = 18$ (Fig. 2).

Voucher specimen. **Italy**. **Calabria**. Italia, Sila, Silvana Mansio, close to Monte Scuro (WGS84: 39.334742°N, 16.339223°E), 18 June 2019, *L. Bernardo* (PI066749).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 h and then fixed in Carnoy solution for 1 h. After hydrolysis in 1N HCl at 60 °C for 7.5 minutes, the tips were stained with leuco-basic fuchsine.

Observations. *Armeria brutia* is endemic to the Sila Massif (Brullo et al. 2004). The observed chromosome count is consistent with that reported by Brullo et al. (1995, under the name *A. canescens* (Host) Ebel) for Monte Scuro.

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Armeria garganica Arrigoni (Plumbaginaceae)

Chromosome number. $2n = 18$ (Fig. 3).

Voucher specimen. Italy. Apulia, Gargano, San Marco in Lamis, Foggia (WGS84 41.751227°N, 15.690502°E), 1 June 2022, *D. Iamonico* (PI66708).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 h and then fixed in Carnoy solution for 1 h. After hydrolysis in 1N HCl at 60 °C for 7.5 minutes, the tips were stained with leuco-basic fuchsine.

Observations. *Armeria garganica* is endemic to Puglia, southern Italy (Arrigoni 2015). The chromosome number of this species is reported here for the first time, and is in line with that observed in all other *Armeria* taxa (Rice et al. 2015; Peruzzi and Bedini 2024).

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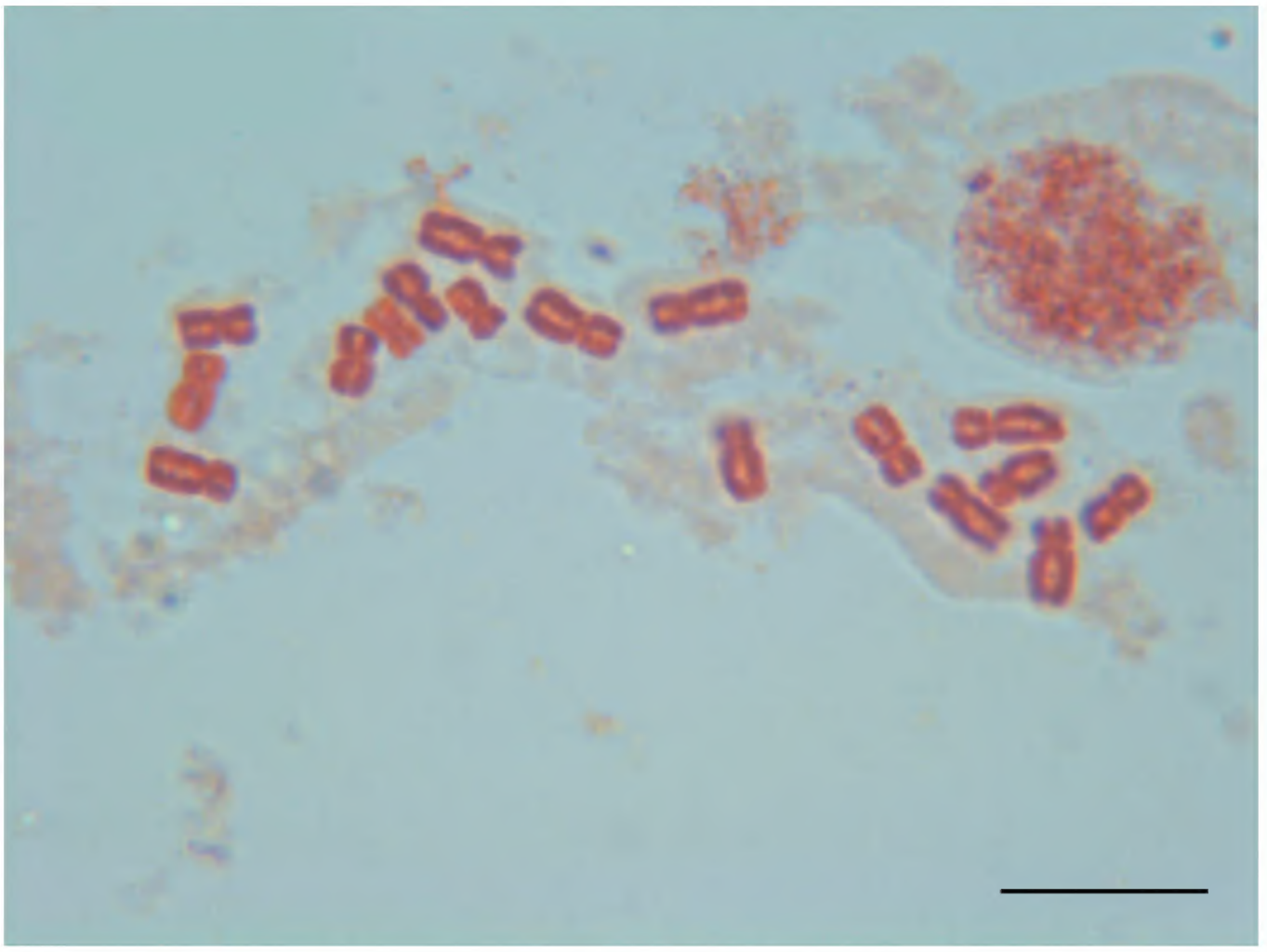

Figure 1. *Armeria aspromontana* from Contrada Nardello (Santo Stefano in Aspromonte, Reggio Calabria), $2n = 18$. Scale bar = 10 μm.

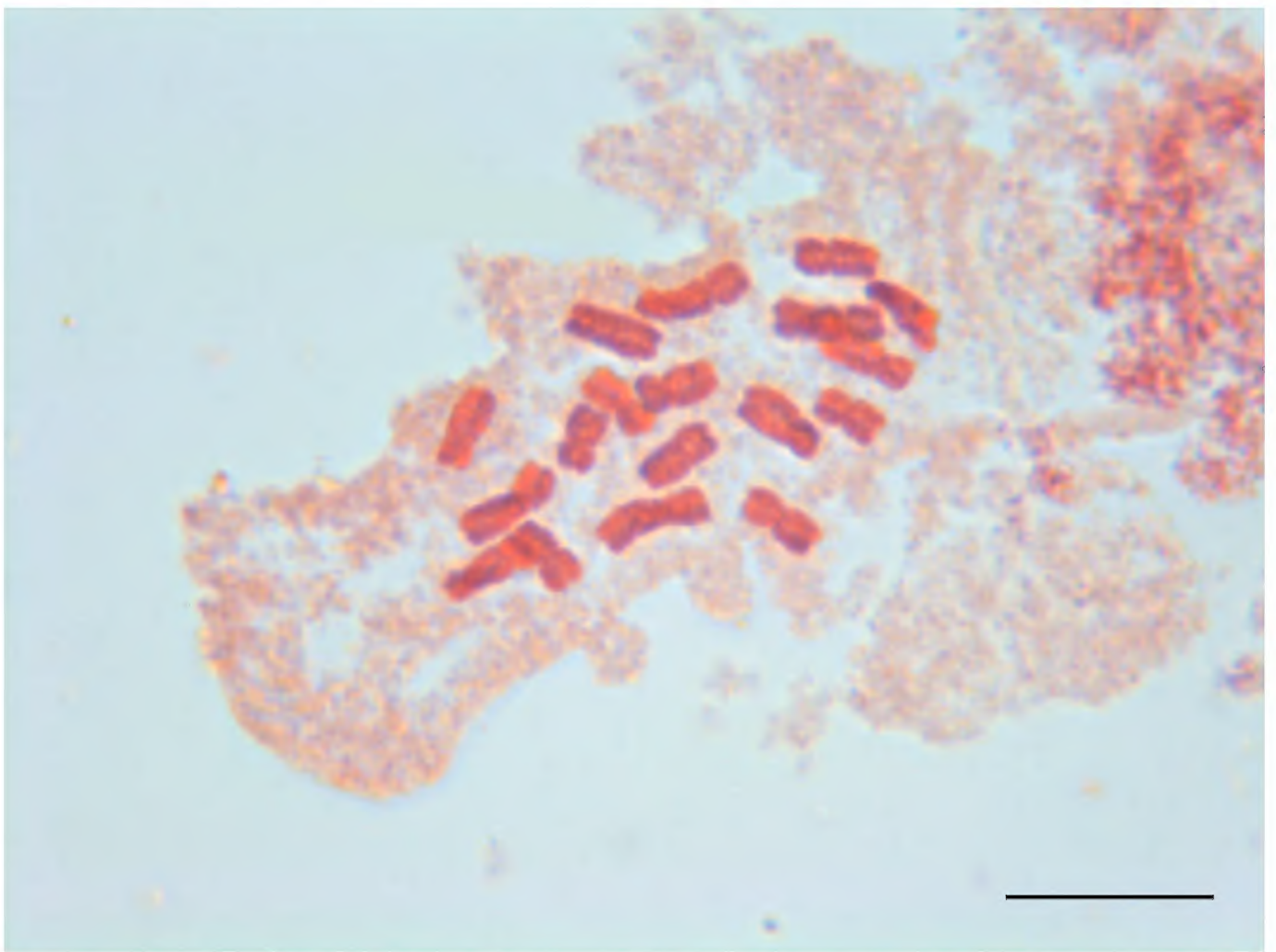

Figure 2. *Armeria brutia* from Silvana Mansio (Casali del Manco, Cosenza), $2n = 18$. Scale bar: 10 μm.

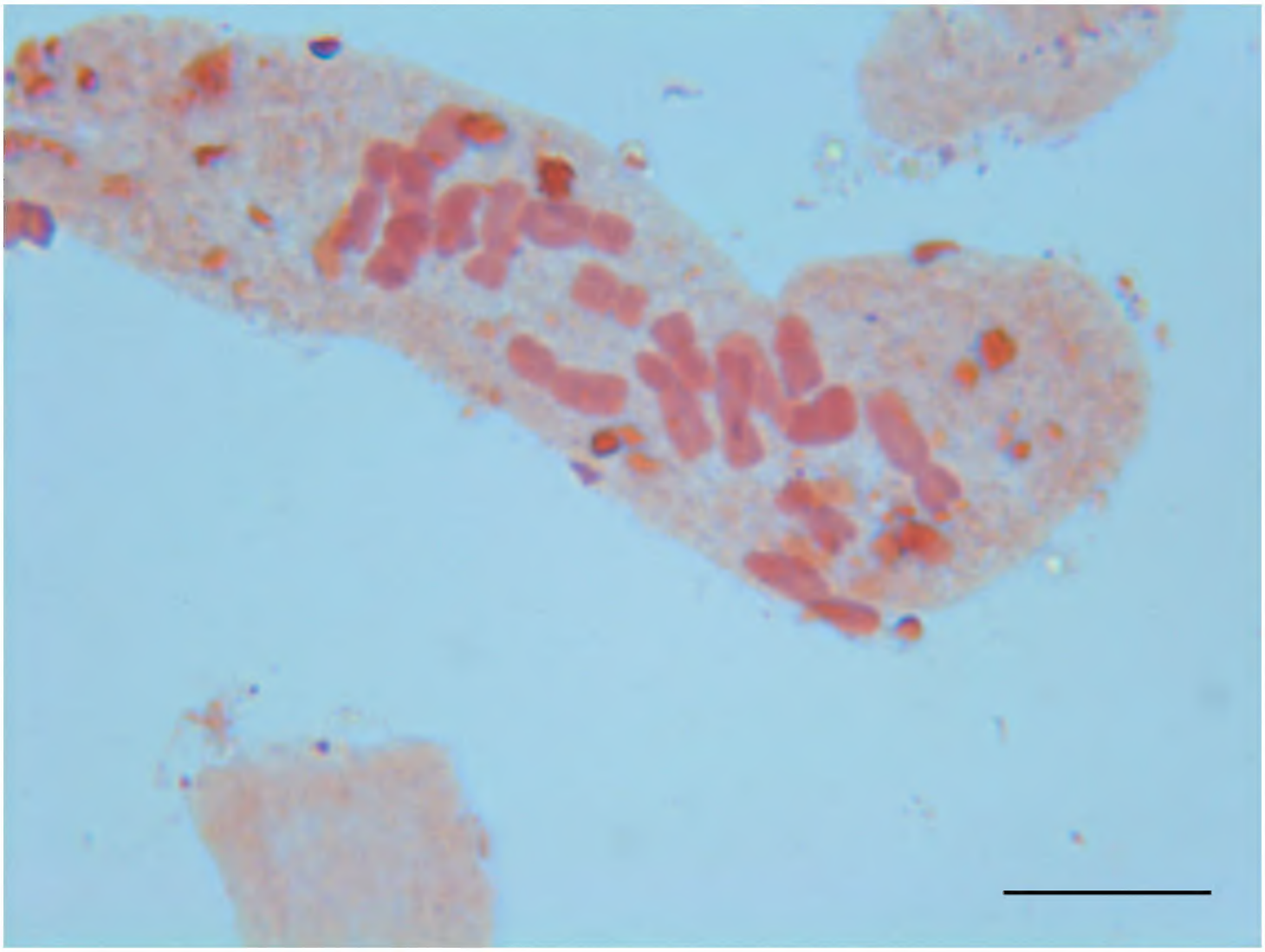

Figure 3. *Armeria garganica* from San Marco in Lamis (Gargano, Apulia), $2n = 18$. Scale bar: 10 µm.

Armeria gracilis Ten. (Plumbaginaceae)

Chromosome number. $2n = 18$ (Figs 4–9).

Voucher specimen. Italia. **Abruzzo**, Monte Morrone, Passo San Leonardo (WGS84 42.053020°N, 14.053311°E), 19 June 2020, *F. Bartolucci & F. Conti* (PI65462).

Voucher specimen. Italia. **Marche**, Monte Cucco, Sigillo (WGS84 43.359190°N, 12.748779°E), 15 June 2021, *D. Iamonico* (PI066729).

Voucher specimen. Italy. **Abruzzo**, Monte Corno, Vado di Corno (WGS84 42.447867°N, 13.588635°E), 26 June 2020, *F. Bartolucci & F. Conti* (PI65400).

Voucher specimen. Italy. **Abruzzo**, Abruzzo, Majella al Blockhaus (42.148431°N, 12.748938°E), 17 June 2020, *F. Bartolucci & F. Conti* (PI65420).

Voucher specimen. Italy. **Abruzzo**, Monti della Meta, loc. Campitelli, Alfedena, L'Aquila, (WGS84 41.699966°N, 13.982889°E), 24 June 2020, *F. Bartolucci & F. Conti* (PI066182).

Voucher specimen. Italy. **Basilicata**, Serra del Prete, Pollino Massif, (WGS84 39.911380°N, 16.132727°E), 23 June 2019, *L. Bernardo* (PI55795).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 h and then fixed in Carnoy solution for 1 h. After hydrolysis in 1N HCl at 60 °C for 7.5 minutes, the tips were stained with leuco-basic fuchsine.

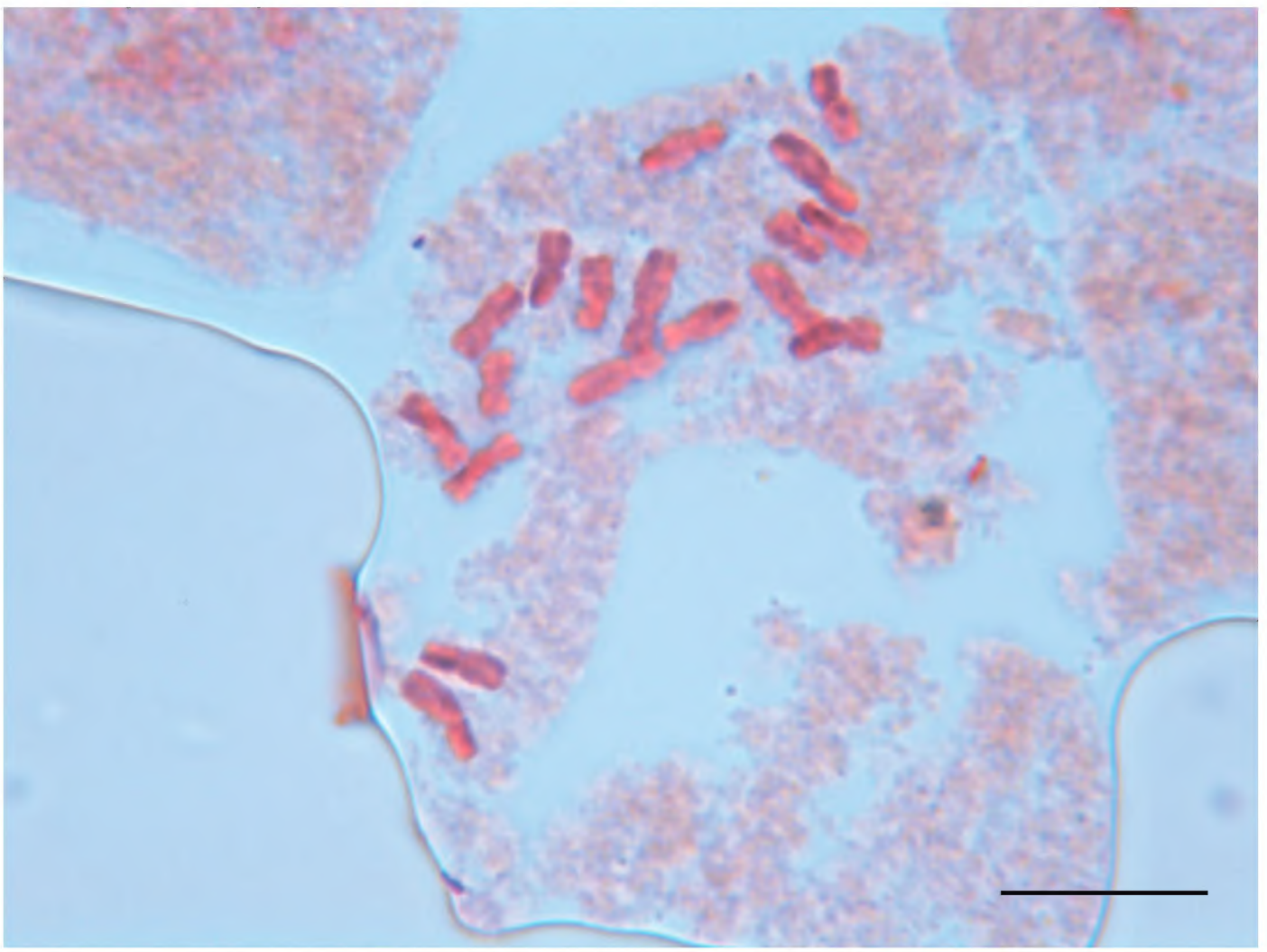

Figure 4. *Armeria gracilis* from Monte Morrone (Aquila, Abruzzo), $2n = 18$. Scale bar: 10 μm.

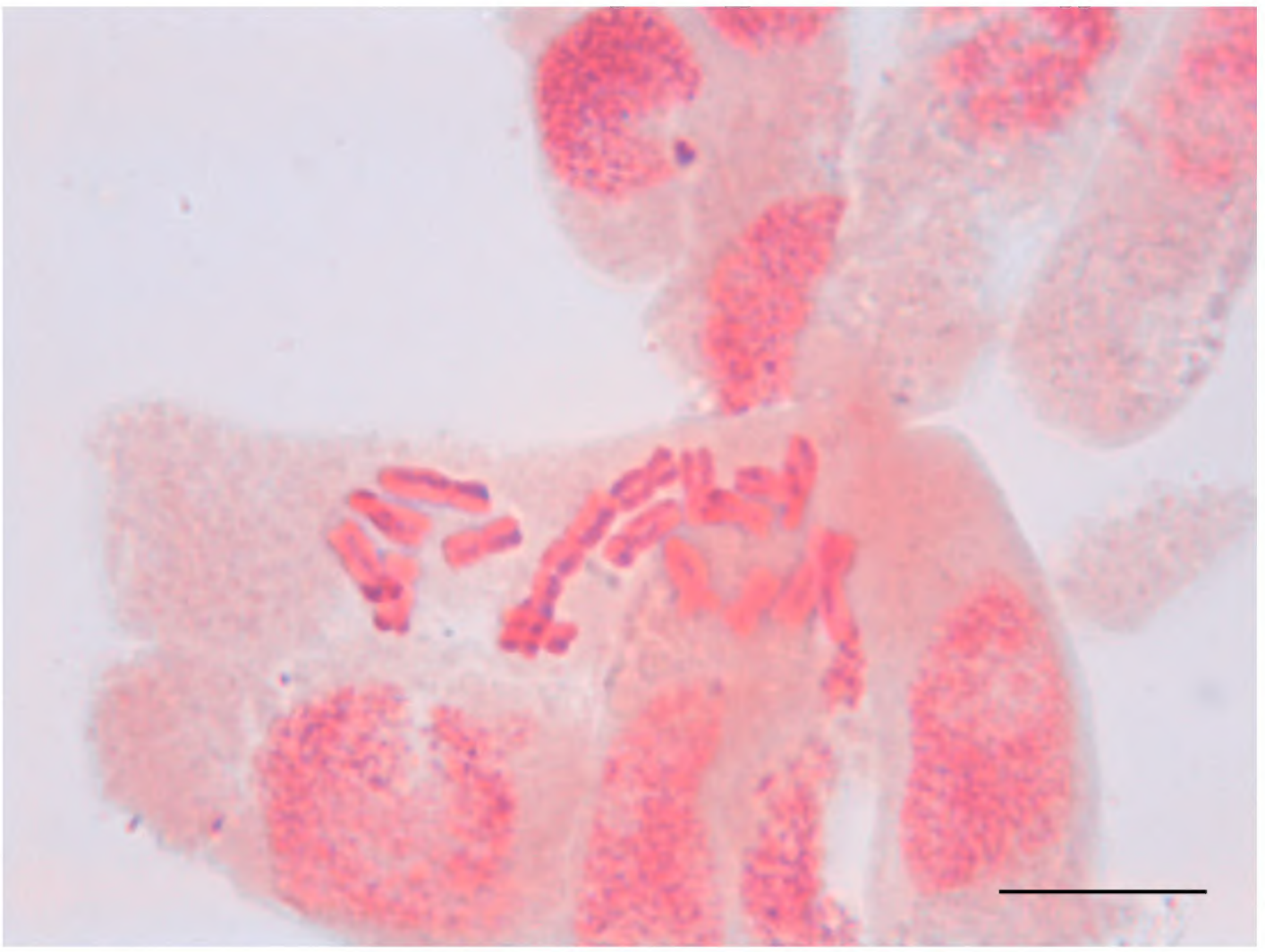

Figure 5. *Armeria gracilis* from Monte Cucco (Sigillo, Abruzzo), $2n = 18$. Scale bar: 10 μm.

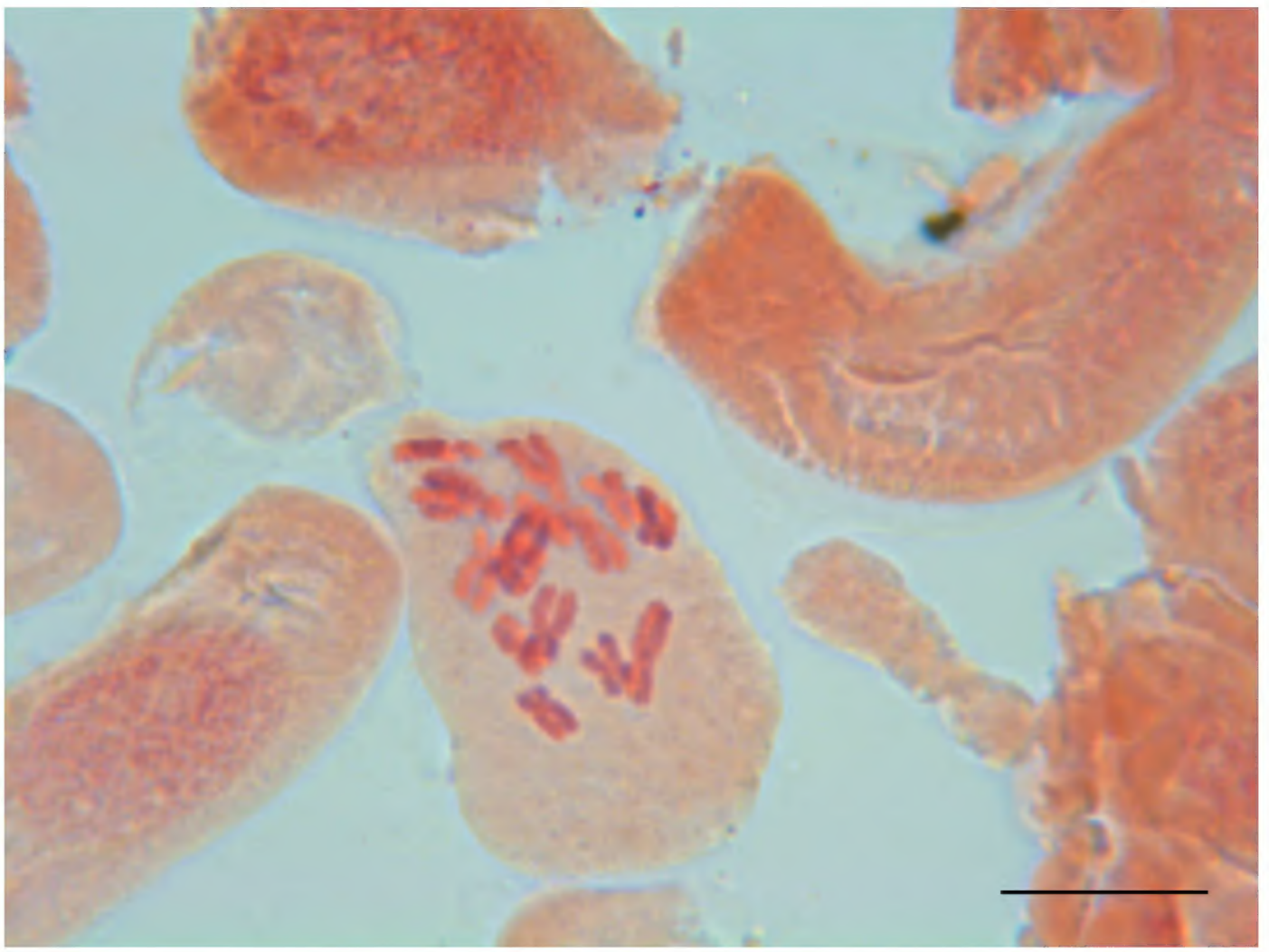

Figure 6. *Armeria gracilis* from Monte Corno (L'Aquila, Abruzzo), $2n = 18$. Scale bar: 10 μm.

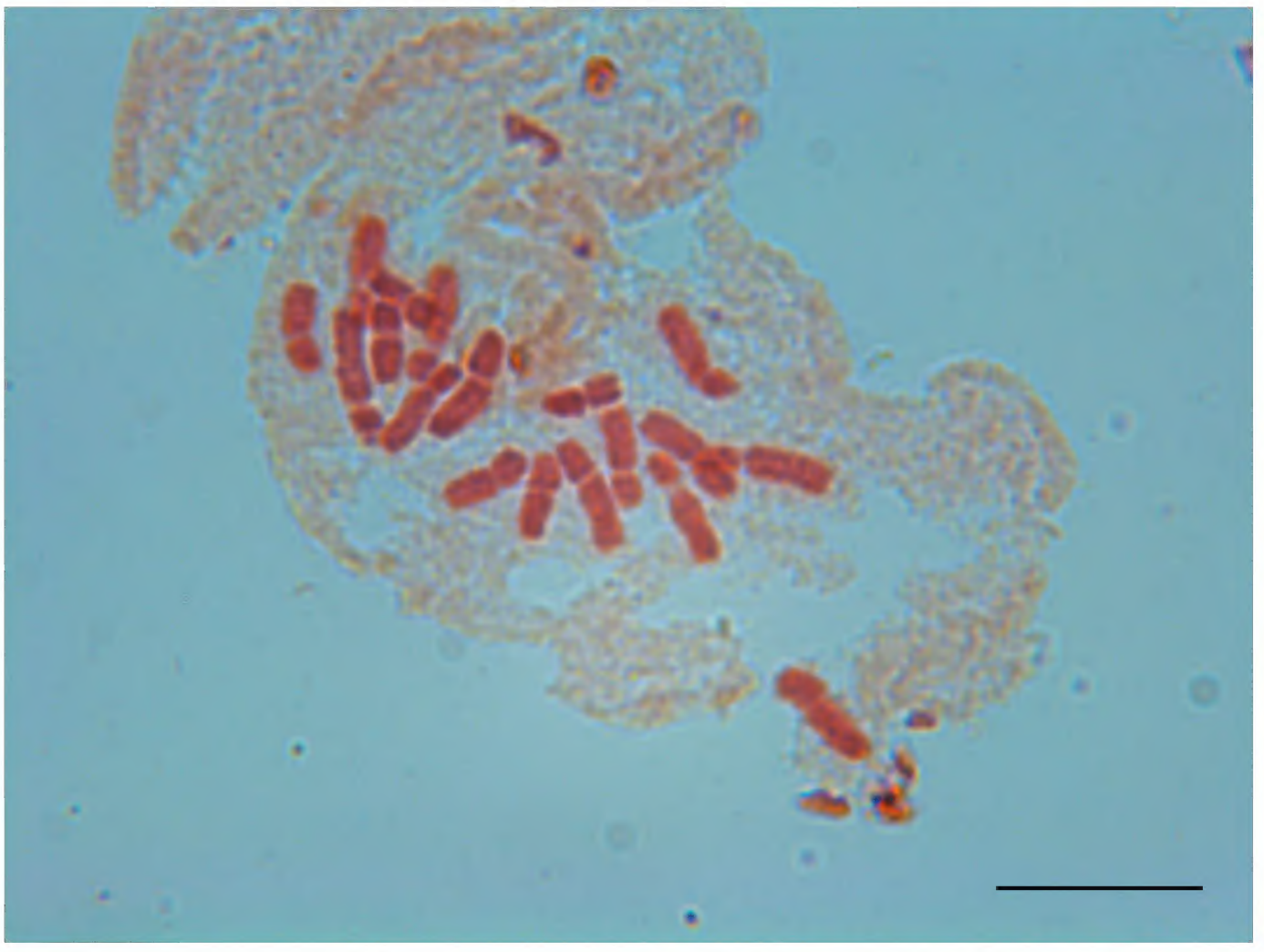

Figure 7. *Armeria gracilis* from Blockhaus mountain, Majella (Chieti, Abruzzo), $2n = 18$. Scale bar: 10 μm.

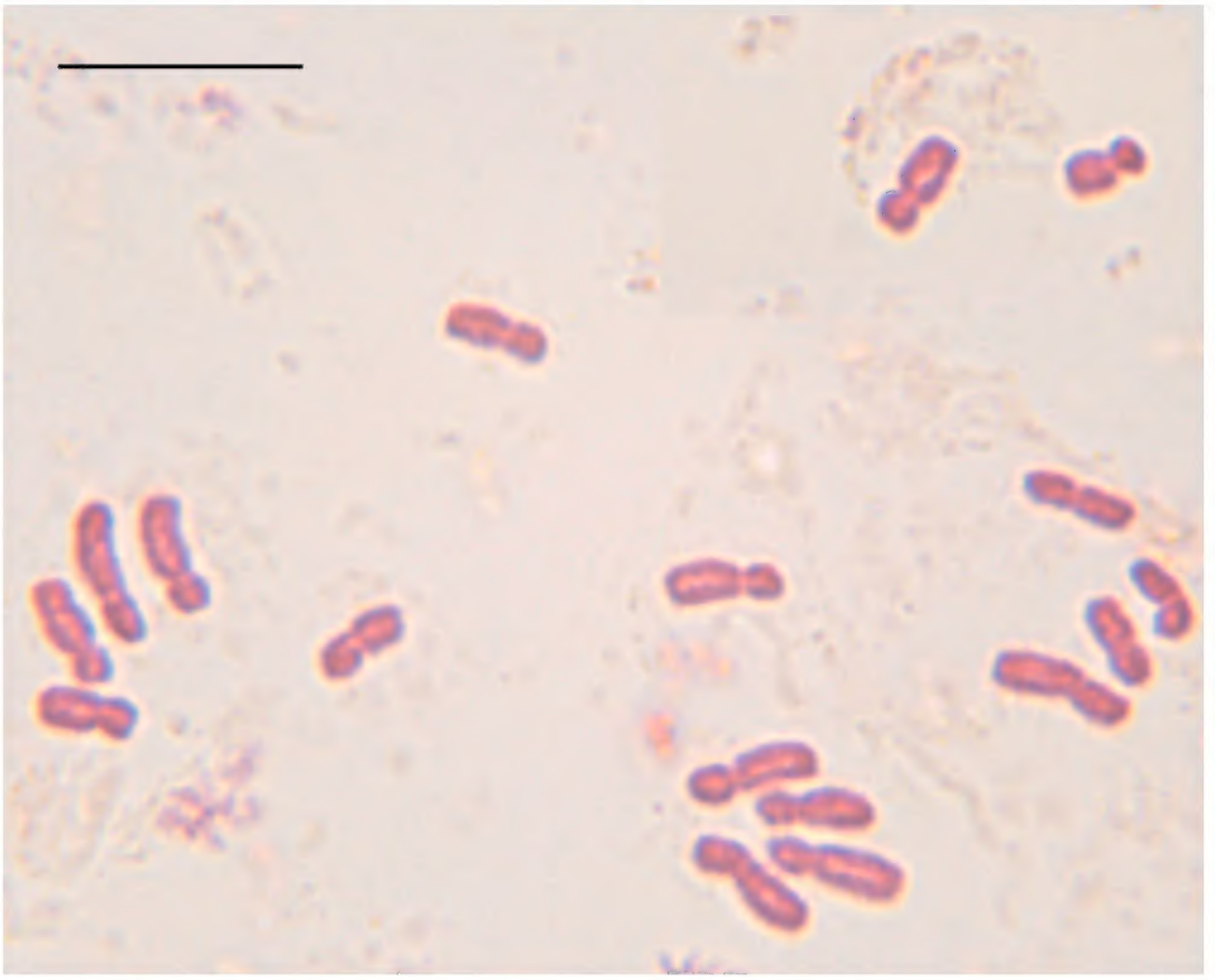

Figure 8. *Armeria gracilis* from Monti della Meta, Alfedena (L'Aquila, Abruzzo), $2n = 18$. Scale bar: 10 μm.

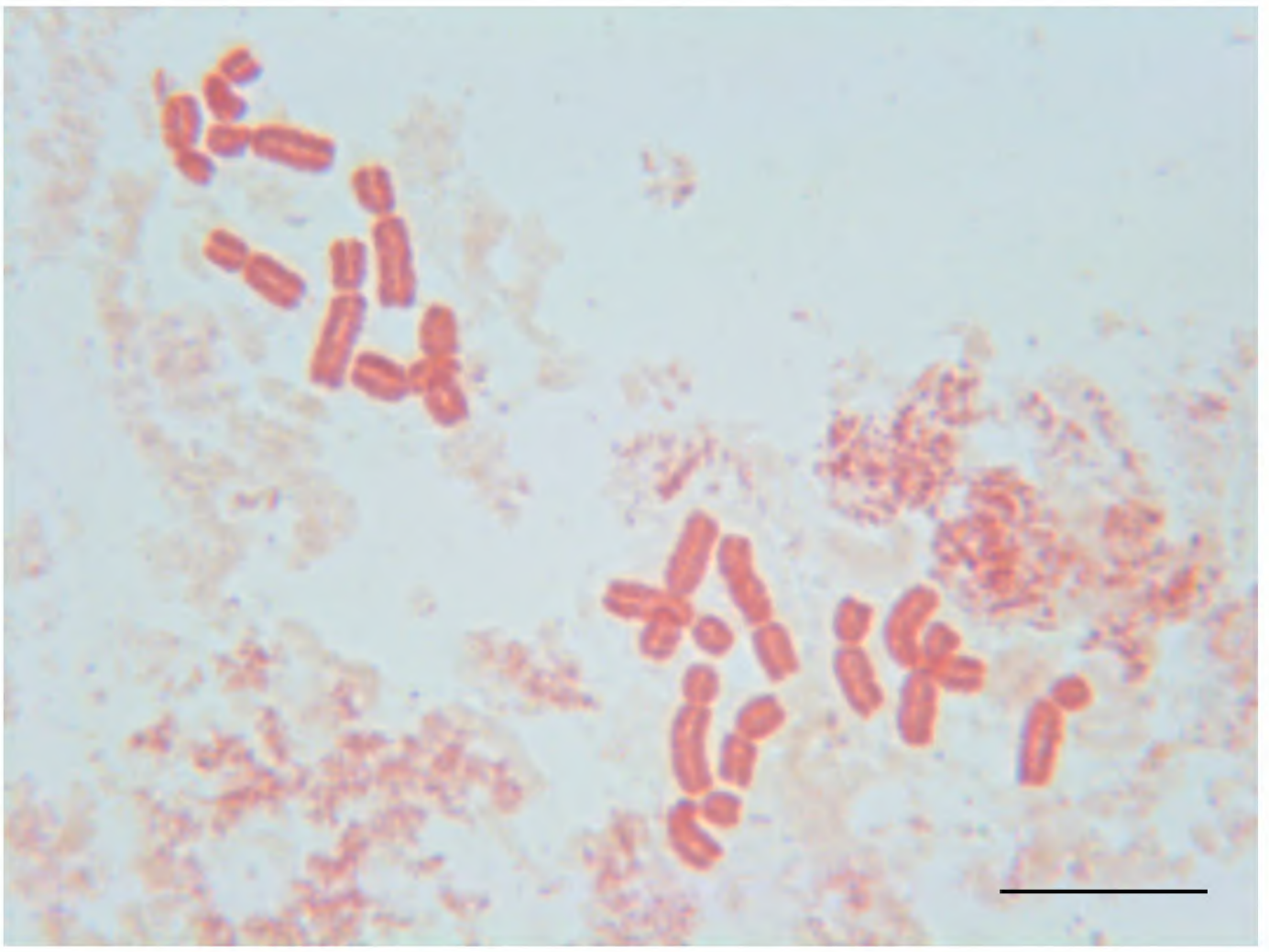

Figure 9. *Armeria gracilis* from Serra del Prete, Pollino Massif (Potenza, Basilicata), $2n = 18$. Scale bar: 10 μm.

Observations. According to Arrigoni (2015), the taxa studied here should be referred to *A. gracilis* subsp. *gracilis* for populations from Gran Sasso, Monte Morrone, and Pollino Massif (central and southern Italy) or to *A. gracilis* subsp. *majellensis* (Boiss.) Arrigoni for populations from the Majella Massif and Monti della Meta (central Italy). However, as already highlighted by Bartolucci et al. (2024) and Iamonico et al. (2024), the distinction of these two taxa is doubtful and need further studies. The count from Vado di Corno agrees with that made by Kovanda (1983, under the name *A. majellensis* Boiss.) on plants from Gran Sasso. The count from Pollino Massif agrees with that made by Brullo et al. (1995, under the name *A. majellensis* Boiss. subsp. *ausonia* Bianchini) on plants from the same area. Plants from the latter area, originally described as *A. gracilis* var. *pollinensis* N.Terracc. (Terracciano 1891), show several morphological differences and need further studies.

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***Armeria gussonei* Boiss. (Plumbaginaceae)**

Chromosome number. $2n = 18$ (Fig. 10).

Voucher specimen Italy. **Sicily**, Rocca Busambra, Palermo, (WGS84 37.856170°N, 13.402200°E), 5 July 2023, *G. Domina & G. Barone* (PI066439).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 h and then fixed in Carnoy solution for 1 h. After hydrolysis in 1N HCl at 60 °C for 7.5 minutes, the tips were stained with leuco-basic fuchsine.

Observations. The chromosome count agrees with that made by Colombo et al. (1980) for the same area.

M. Tiburtini, G. Barone, S. Fruzzetti, L. Peruzzi

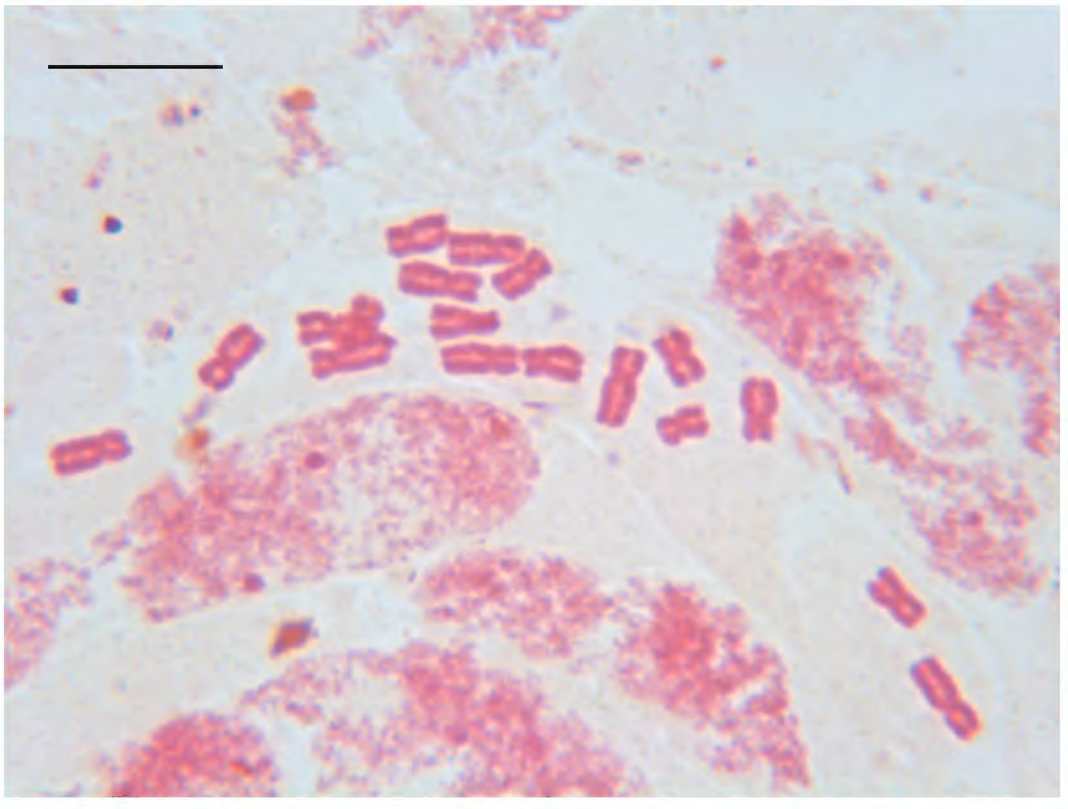

Figure 10. *Armeria gussonei* from Rocca Busambra (Palermo, Sicily), $2n = 18$. Scale bar: 10 μm.

***Armeria macropoda* Boiss. (Plumbaginaceae)**

Chromosome number. $2n = 18$ (Fig. 11, 12).

Voucher specimen. Italy. Campania, Ripa della Falconara, pendici del Monte Terminio (WGS84 40.818083°N, 14.941297°E), 20 June 2019, *L. Bernardo* (PI065461).

Voucher specimen. Italy. Basilicata, Pignola, Serranetta, Potenza, (WGS84 40.564865°N, 15.815888°E), 1 June 2022, *D. Iamonico* (PI66709).

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 h and then fixed in Carnoy solution for 1 h. After hydrolysis in 1N HCl at 60 °C for 7.5 minutes, the tips were stained with leuco-basic fuchsine.

Observations. *Armeria macropoda* is endemic to southern Italy. Although both the studied localities are referred by Arrigoni (2015) to this species, the population from Basilicata shows several morphological differences, resembling more *A. garganica* than *A. macropoda* from Monte Terminio, that likely corresponds to the type locality of this species (Iamonico et al. 2024). The chromosome number of this species is reported here for the first time.

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***Armeria nebrodensis* (Guss.) Boiss. (Plumbaginaceae)**

Chromosome number. $2n = 18$ (Fig. 13).

Voucher specimen. Italy. Sicily. Monte San Salvatore, Madonie, Piano Grande (WGS84 37.842780°N, 14.031291°E), 4 July 2023, *G. Domina* (PI66440).

Figure 11. *Armeria macropoda* from Ripa della Falconara, Monte Terminio, (Avellino, Campania), $2n = 18$. Scale bar: 10 μm.

Method. Squash preparations were made on root tips obtained from germinating seeds. Root tips were pre-treated with 0.4% colchicine for 3 h and then fixed in Carnoy solution for 1 h. After hydrolysis in 1N HCl at 60 °C for 7.5 minutes, the tips were stained with leuco-basic fuchsine.

Observations. This chromosome count agrees with that made by Bartolo et al. (1981) for the same area.

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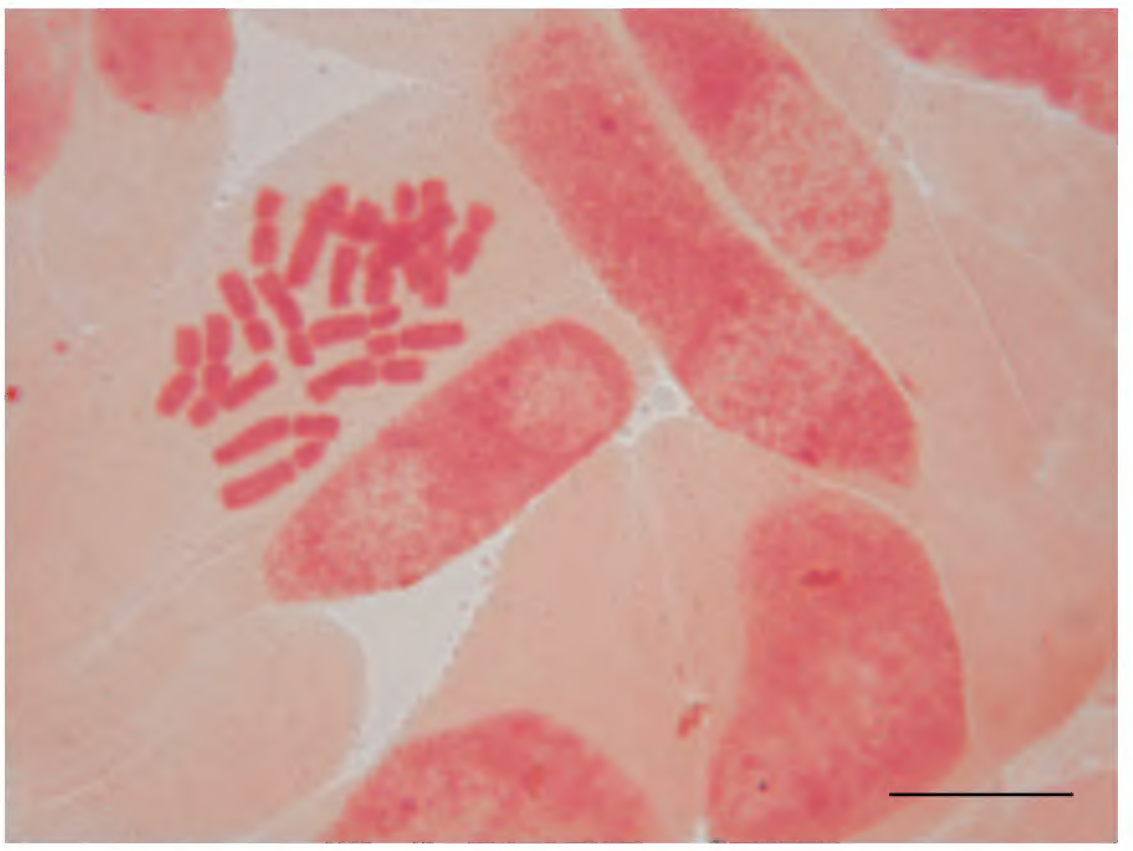

Figure 12. *Armeria macropoda* from Mt. Serranetta near Pignola (Potenza, Basilicata), $2n = 18$. Scale bar: 10 μm.

Figure 13. *Armeria nebrodensis* from San Salvatore (Madonie, Sicily), $2n = 18$. Scale bar: 10 μm.

References

Arrigoni PV (2015) Contribution to the study of the genus *Armeria* (Plumbaginaceae) in the Italian peninsula. Flora Mediterranea 25: 7–32. https://doi.org/10.7320/FlMedit25SI.007

Bartolucci F, Peruzzi L, Galasso G, Alessandrini A, Ardenghi NMG, Bacchetta G, Banfi E, Barberis G, Bernardo L, Bouvet D, Bovio M, Calvia G, Castello M, Cecchi L, Del Guacchio E, Domina G, Fascetti S, Gallo L, Gottschlich G, Guarino R, Gubellini L, Hofmann N, Iberite M, Jiménez-Mejías P, Longo D, Marchetti D, Martini F, Masin RR, Medagli P, Peccenini S, Prosser F, Roma-Marzio F, Rosati L, Santangelo A, Scoppola A, Selvaggi A, Selvi F, Soldano A, Stinca A, Wagensommer RP, Wilhalm T, Conti F (2024) A second update to the checklist of the vascular flora native to Italy. Plant Biosystems 158(2): 219–296. https://doi.org/10.1080/11263504.2024.2320126

Bartolo G, Brullo S, Pavone P (1981) Números cromosomáticos de plantas occidentales, 138–156. Anales del Jardín Botánico de Madrid 38: 288–299.

Brullo S, Scelsi F, Spampinato G (1997) A new species of *Armeria* (Plumbaginaceae) from S Italy. Edinburgh Journal of Botany 54: 91–97. https://doi.org/10.1017/S0960428600003887

Brullo S, Gangale C, Uzunov D (2004) The orophilous cushion-like vegetation of the Sila Massif (S Italy). Botanische Jahrbücher für Systematik, Pflanzengeschichte und Pflanzengeographie 125: 453–488. https://doi.org/10.1127/0006-8152/2004/0125-0453

Brullo S, Guglielmo A, Pavone P, Terrasi, Maria Carmen (1995) Numeri cromosomici per la flora italiana: 1314–1334. Informatore Botanico Italiano 26: 200–213.

Buzurović U, Jakovljevic K, Niketic M, Senic T, Tomovic G (2015) Genus *Armeria* Willd. (Plumbaginaceae) in Serbia based on two herbarium collections in Belgrade. Bulletin of the Natural History Museum 8: 75–86. https://doi.org/10.5937/bnhmb1508075B

Colombo P, Marcenò C, Princiotta R (1980). Numeri cromosomici per la flora italiana: 591–597. Informatore Botanico Italiano 11(1) (1979): 27–30.

Iamonico D, Domina G, Tiburtini M, Peruzzi L (2024) Typification of the names in *Armeria* (Plumbaginaceae) recorded for Italy. Phytotaxa 665: 193–200. https://doi.org/10.11646/phytotaxa.665.3.2

Kovanda M (1983) Chromosome numbers in selected Angiosperms (1). Preslia 55: 193–205.

Peruzzi L, Bedini G (2024) Chrobase.it - Chromosome numbers for the Italian flora v. 2.0. Chrobase.it. http://bot.biologia.unipi.it/chrobase/ [October 21, 2024]

Rice A, Glick L, Abadi S, Einhorn M, Kopelman NM, Salman-Minkov A, Mayzel J, Chay O, Mayrose I (2015) The Chromosome Counts Database (CCDB) – a community resource of plant chromosome numbers. New Phytologist 206: 19–26. https://doi.org/10.1111/nph.13191

Terracciano N (1891) Synopsis plantarum vascularium Montis Pollini. Annuario Regio Istituto Botanico di Roma 4: 1–191. https://doi.org/10.5962/bhl.title.10001